

Animal Husbandry Farm Automation

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ABSTRACT

This document lays out a project plan for the development of a "Smart Poultry Farming System" an automated Poultry Farm that helps the farmers to keep a daily track of the activities going on in his/her farm remotely through use of the Internet. By using technologies like IOT and WSN, the amount of temperature, Humidity, gases in air, Luminosity and water level of the poultry can be taken care of.

KEYWORDS: Arduino, IOT, WSN, Android Application, Automation, Poultry Farming

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1. INTRODUCTION

Most of the people in India are occupied in agricultural farming with the expectations of sufficient earning for the living. They suffer heavy losses due to extreme change in environmental conditions and lack of resources and they forcefully commit suicide. So recently these agricultural farmers are switching to poultry farming as also recommended by the government. This business can count out to be very beneficial for them.

"It's one of the major booming sectors of the Indian Economy"

While the production of agricultural crops has been rising at a rate of 1.5 to 2 percent per annum, this of eggs and broilers has been rising at a rate of 8 to 10 percent per annum. Due to this, India has become now the 5th and the 8th largest producer of the eggs and the broilers respectively. And this expansion is a combination of factors and growth in per capita income, the population of the urban is growing and resulting in falling of real poultry prices.

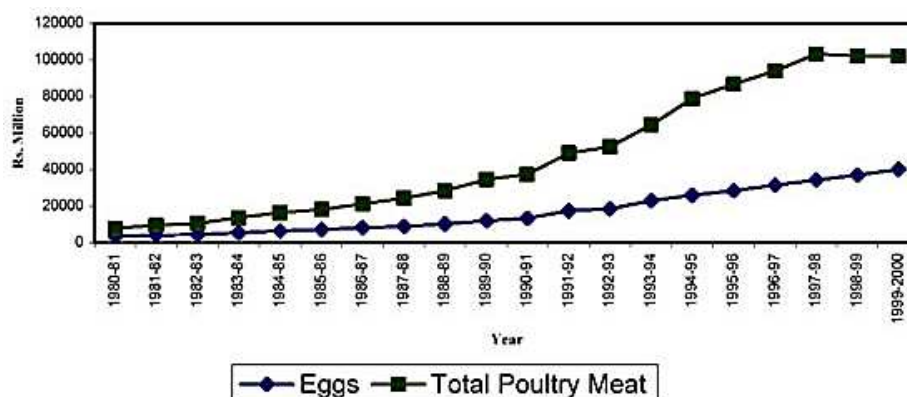


Fig 1.1 Increase in Poultry production of India from 1980-2000

Still, Indian Poultry farming is done at a very primitive level. They are not capable of generating the required temperature, humidity, luminosity, ventilation and hygiene level and as a result there hens suffer from various changes like eating their own eggs, shedding of feather, that effects their growth and egg laying period.

➤ Even after investing large amount of money they suffer from losses because Indian poultry sector is lagging its technological specification and involves most of the labour intensive work. Such things don't only cause the economic losses to the farmers but also sufficient to kill their will to continue.

So we wanted to give ease and a little boost up for this whole process of production and provide the Indian Poultry farmers a new and cheaper of production.

Problem Statement/Objective

"To help the poultry farm owners easily monitor and access it without being physically present there on their smartphones."

2. Overview

2.1. Challenge

It's a major problem to understand the basic conditions of the farm and poultry that some new poultry farmers don't understand at once. And it is not necessary that only an amateur will going to face the problems in the poultry farm and with birds experienced people also can face the problem as we are humans only we can sense what is bearable for the birds.

In some countries where the temperature is very much low and poultry birds can't live outside their barns so those farmers do an indoor poultry farming where the temperature and other parameters are maintained manually so that the environment is bearable by the hens so that they remain healthy and lay their eggs easily. But in those systems also a proper functioning is not applied due to any reason whether it is a human parallax or some other faults so that affects the health of the hens a lot and that can increase the stress in between them a lot.

So the consequences of that stress build-up are:

- Picking & Cannibalism
- Egg Eating
- Moulting
- Chicken Mites
- Diseases
- Broody Hens

Keeping chickens isn't very difficult; but, sometimes they do suffer from various health problems or other issues that generally can't be figured out easily by us. Some common health problems which might be seen in laying hens or other poultry birds like duck, turkeys and geese are as follows:-

Picking or Cannibalism

Picking is a disease in which the birds pick each other feathers which sometimes results in bleeding, and since these birds are attracted to the red colour they get attracted towards the blood and attack more and this may result in the death of the injured bird.

Egg Eating

Eating Eggs is a problem in which when any of the eggs break in the nest box then the poultry birds taste it and then it may also lead them to break their unbroken eggs.

Moulting

Moulting isn't a chicken problem, but for a new chicken owner, it can be disconcerting! Your lovely hens will look ragged and bare. Moulting happens once per year (although sometimes twice), typically in the fall. It's when chickens shed their feathers and grow new ones. During this time, they will not lay eggs. Moulting typically lasts 3 months but in some cases, it can be longer. There is nothing to do about moulting - just wait for it to finish.

Chicken Diseases

There are many different diseases that can affect chickens and it can be hard to diagnose them. The basic idea is that once you have an ill bird, you should remove it from the flock and isolate it, in case the disease is contagious. It will also protect her from picking (see above) by the rest of the flock.

2.2. Solution:

The proposed system "SMART POULTRY FARMING SYSTEM" will be going to work as "REAL TIME DATA COLLECTOR AND TRANSMITTER" and all the data will be sent to the registered mobile phone that is, of some caretaker or the owner only so that they can track what is actually happening on their farm. This system is going to give each and every single update of the farm right in the smart phone of the User/Caretaker/Owner. So that they can easily make the environment "Poultry Friendly".

So for this, we will be implementing a WSN (Wireless sensor network) with IOT (Internet of things). The WSN will be implemented using the Arduino Uno with some combination of sensors and alarms and those are:

1. MQ-2 Semiconductor Sensor (Combustible Gas)
2. MQ-135 Air Quality Sensor (Hazardous Gas)
3. Module DHT11 for Raspberry Pi (Humidity and Temperature Sensor)
4. Ultrasonic sensor for the FEED WATER CHECKER
5. Wi-Fi Module

and these all will be working together to create a WSN and those data values will be pushed in the database and all the data values will be then sent to Firebase. Now Firebase module will be employed for saving the environmental values and perform some sort of action automatically if that exceeds the threshold values that are already set as "DEFAULT" by sending the updates to the registered mobile. For registering the mobile number with the project we will be developing an android app so that the users can get register their mobile with this system so that they can track each and every activity of the farm.

3. Design Plan of the Project

3.1. Customer Accessibility

The Poultry Farm owner caretakers and anyone can use this application whether he is literate or not.

S. No.	CUSTOMER	LEVEL OF ACCESSIBILITY OF SYSTEM
1.	Caretaker	7-8
2.	Owner	8-9
3.	Farmer	6-7
4.	Layman	6-7

Table 3.1 Level of Customer Accessibility of System

3.2. Functionality

A. Arduino Modules:

- I. Gas/Smoke sensing Module
- II. Humidity sensing Module
- III. Temperature Sensing Module
- IV. Water Level Indicator

B. Firebase Database Module:

- I. Module for saving the Real Time data base values in the Firebase Real Time Database

- II. Module for the Firebase Google Authentication for Login and Registration of the Poultry Farm
- III. Module for Login and Registration of the Poultry Farm through a custom Registration form

C. Android Mobile App:

- I. A module that will include the registration and login module to register on the SPFS Module of the Firebase
- II. A module that will include SPFS Module of the Firebase Google Authentication for Logging in the app
- III. A Splash Screen module
- IV. A module that will show on the first time installation of the app: Introduction Slider/Walkthrough on the App
- V. A module for checking the Internet Connectivity on Device
- VI. A module for making the Designing the UI of app somewhat like Integra's Dashboard
- VII. A module to grab the data and other useful information from the Firebase Module and display it on the app

3.3. Platform

It will be launched both as a combination of Mobile app for Android and a hardware system that is designed on Arduino UNO.

Arduino UNO is used with these sensors:

1. MQ-2 Semiconductor Sensor (Combustible Gas)
2. MQ-135 Air Quality Sensor (Hazardous Gas)
3. Ultrasonic sensor for the FEED WATER CHECKER
4. Module DHT11 (Humidity and Temperature Sensor)
5. Wi-Fi Module ESP12

3.4. ASM of the Project

This ASM explains how this project works, where data goes, how data is saved and retrieved.

Threshold values for the system are:

- Gases : $\text{NH}_3 < 50\%$, $\text{CH}_4 < 40\%$ for ventilation
- Light : $> 45\%$
- Temperature : 24 C to 32 C
- Water Level : must remain constant as we don't want to make our birds thirsty

If temperature is < 24 C then heater will be made ON and If temperature is > 32 C then some Fan will be made ON
If humidity increases then it must a window open and close
If luminosity goes down then it must make the bulb ON or off on the bases of intensity of Light.

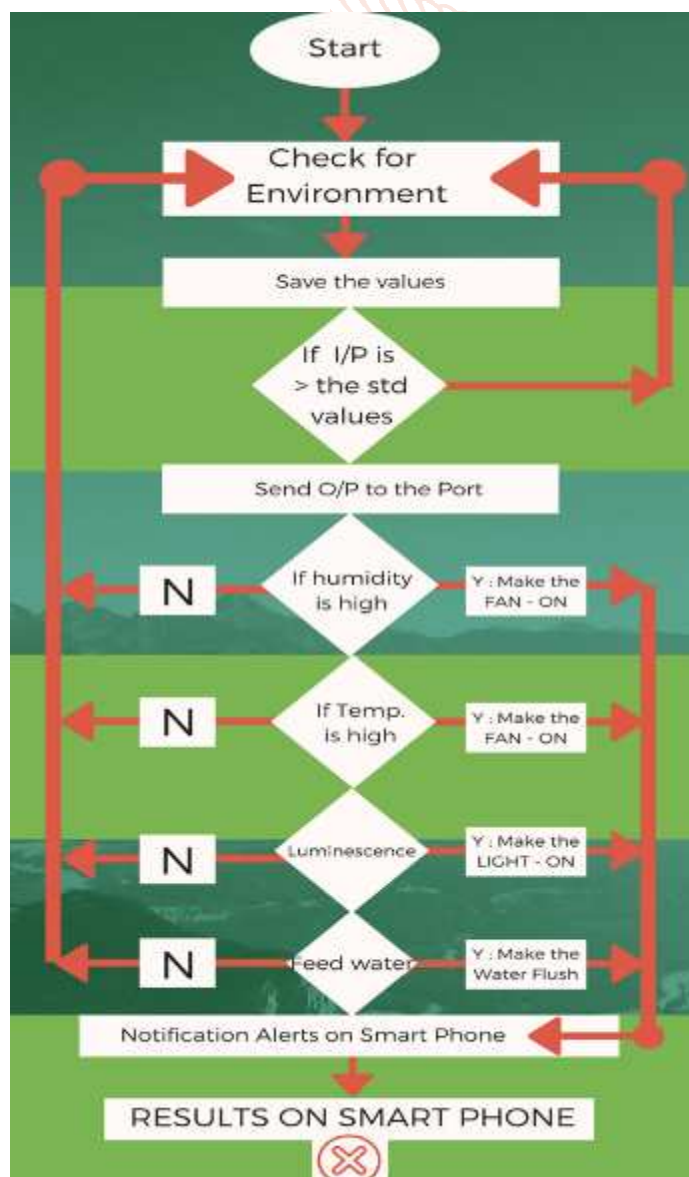


Fig. 3.1 ASM of the whole Project

3.5. Internet Requirement:

We will be required a reliable and strong Internet access in

our Poultry Farm for pushing the data on Firebase and then doing the further automation.

4. Outputs

➤ Login Page



Fig. 5.12 Login Page

➤ Registration Page



Fig. 5.13 Registration Page

➤ Dashboard of the app



Fig. 5.13 Dashboard of the App

➤ Temperature Module

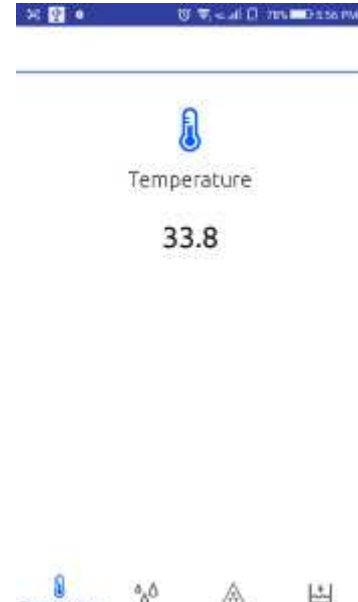


Fig. 5.15 Temperature Page

➤ Humidity Module

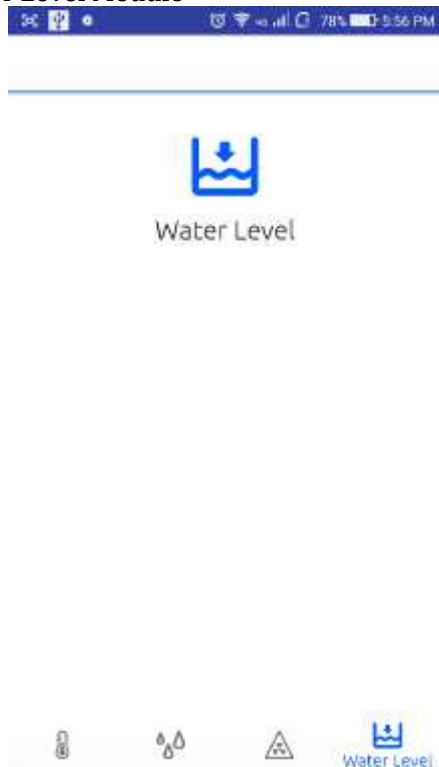


Fig. 5.16 Humidity Page

➤ Harmful Gas Module



Fig. 5.16 Gas Page

➤ **Water Level Module****Fig. 5.17 Water Level Page****5. Impact and Future Scope**

New technology is being developed to help increase the efficiency of farming at an alarming rate; but one concern is whether farmers can embrace these new innovations before another new wave is introduced. If farmers are to be capable of feeding the estimated 9 billion people in the world by 2050 then they must become smarter, leaner and cleaner. Technology has a major role to play in farming sector As the availability of land and labour shrinks through time, technology must play a major part in making farming as efficient as it can be, and then some. Robotics and innovative technology are emerging as key players in the global battle to improve agriculture and already exists in various formats. Cows are already being milked by robots, sensors are already improving feeding regimes and identifying diseases, and drones are already helping with crop management; but what does the next wave of ingenious innovation have in store. So, next sector to be automated is Poultry Farming industry and this is what our innovation is trying to achieve. If we have to meet the present and the future demands of the food production then this is what we can do.

5.1. Impact:

The proposed system provides us the best results for maintaining and monitoring which is better and effective, as it takes care of the following points:

1. Better monitoring than the conventional methods of the farm monitoring in terms of the temperature, humidity, gases and other physical components
2. It gives us the best results of the environment like from checking the humidity to the feed water checking by removing the human parallax for checking all these completely.
3. It increases the productivity of the farm by keeping all the things on track.
4. This decreases the extra expenditure on the different types of devices to be installed in the farm.

5.2. Future Scope:

1. Can be used in the poultry farms, by the care taker and the owners to track the record of the farm anytime and anywhere.
2. This is not only designed for the Chickens only, it can be implemented for other birds too like Geese, Turkey, Squab, Duck and much more.
3. Can be used in the Zoological parks as well for checking their coops and the environment values
4. Can be used in the Animal husbandry for some other animals like Alpaca, Squab etc.

6. Literary Survey:

We visited many poultry in Delhi, Haryana and Uttarakhand to know the current scenario of the farms in India to see what essentials things we can add and get a closer idea about this labour intensive industry. So we got to know many things about these farms as we visited all the types of the farms from which mostly were still using the conventional methods of farming that were making a huge amount of loss for these farmers.

So we visited 2 local farms in Delhi and some farms of Haryana as well as Uttarakhand. We marked each aspect of the farm on the scale of 0 to 5, to see the necessity of the parameters that we have to take in our consideration. The questions we asked were like these:

- What is the time taken by chicken to grow?
- How much water is used every day?
- What type of food they give to chickens?
- What is the cost of the farms maintenance?
- What is the cost of food?
- What is the total number of chickens here?

We marked all these aspects on the scale to make sure that the hens get the maximum comfort and the caretaker need to visit farm less frequently.

As per our survey an average Poultry Farm:

- **Area of 20x100 feet**
- **A batch of 1500 birds**
- One batch of poultry hens is ready in 40 days
- 80 Litres of water is needed by a single chicken in a week

PARAMETERS	WITHOUT OUR SYSTEM	WITH OUR SYSTEM
Number of Cycles (batches) in a year	04	08
Profit after selling one Batch	Rs. 1,20,000 (per batch)	Rs. 1,40,000 (per batch)
Loss of hens	100/1500 hens	0/1500 hens
Yearly Profit	Rs. 4,80,000	Rs. 13,00,000
Water Wastage	20%	12%

Table 8.1 Comparison of parameters with and without Smart Poultry Farming System**7. Conclusion**

In Summary, we can say that by using this project we can minimise the cost- effectiveness, labour and death rate of the birds in the poultry farm. Also, maximize the production and the profit of that poultry farm.

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